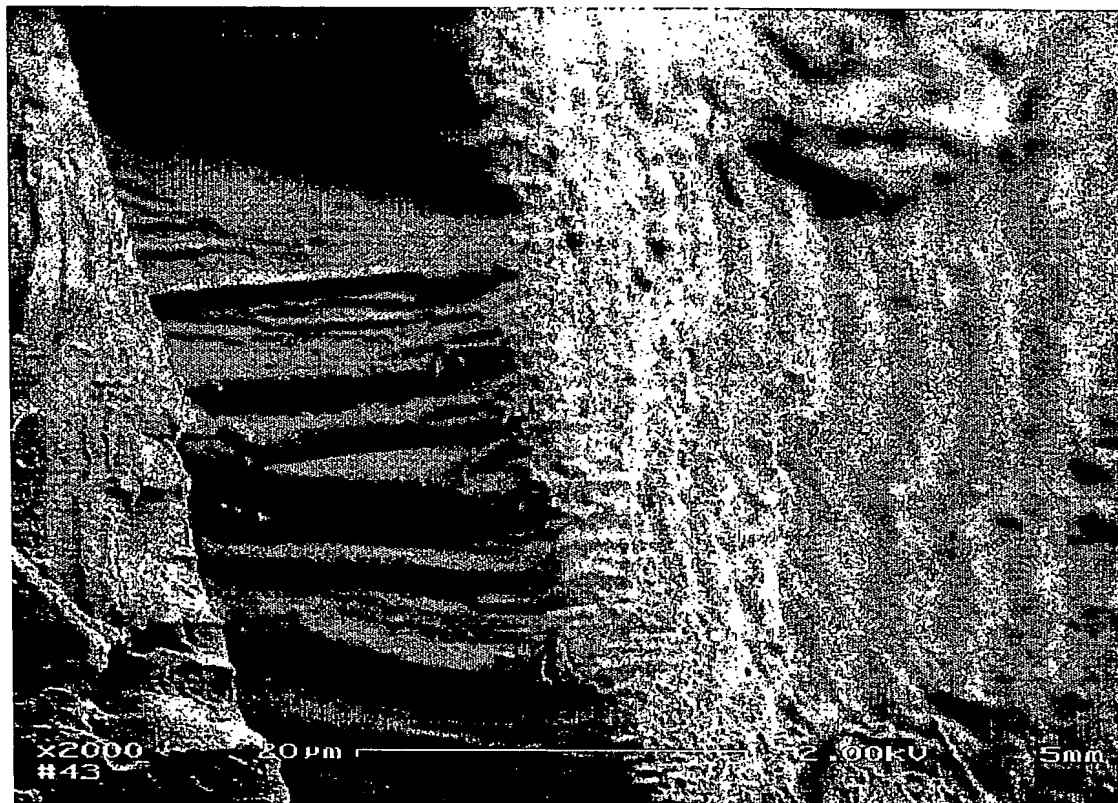


Figure 1



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Figure 2

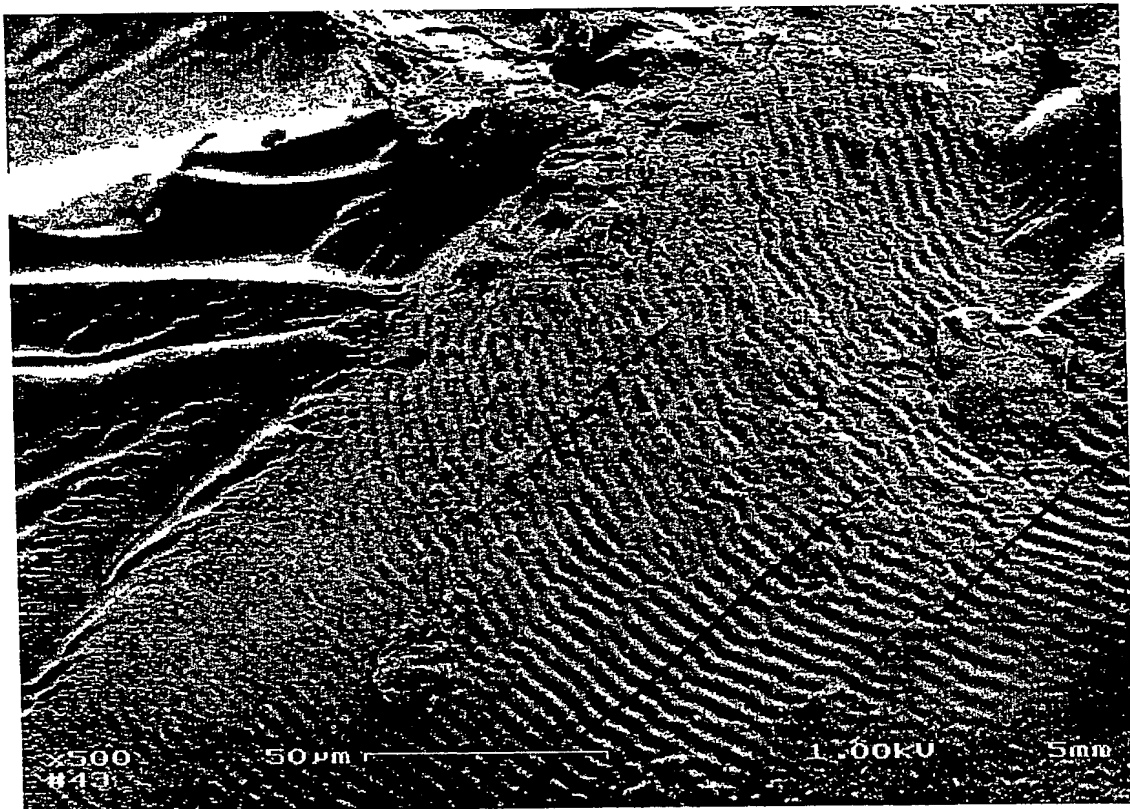


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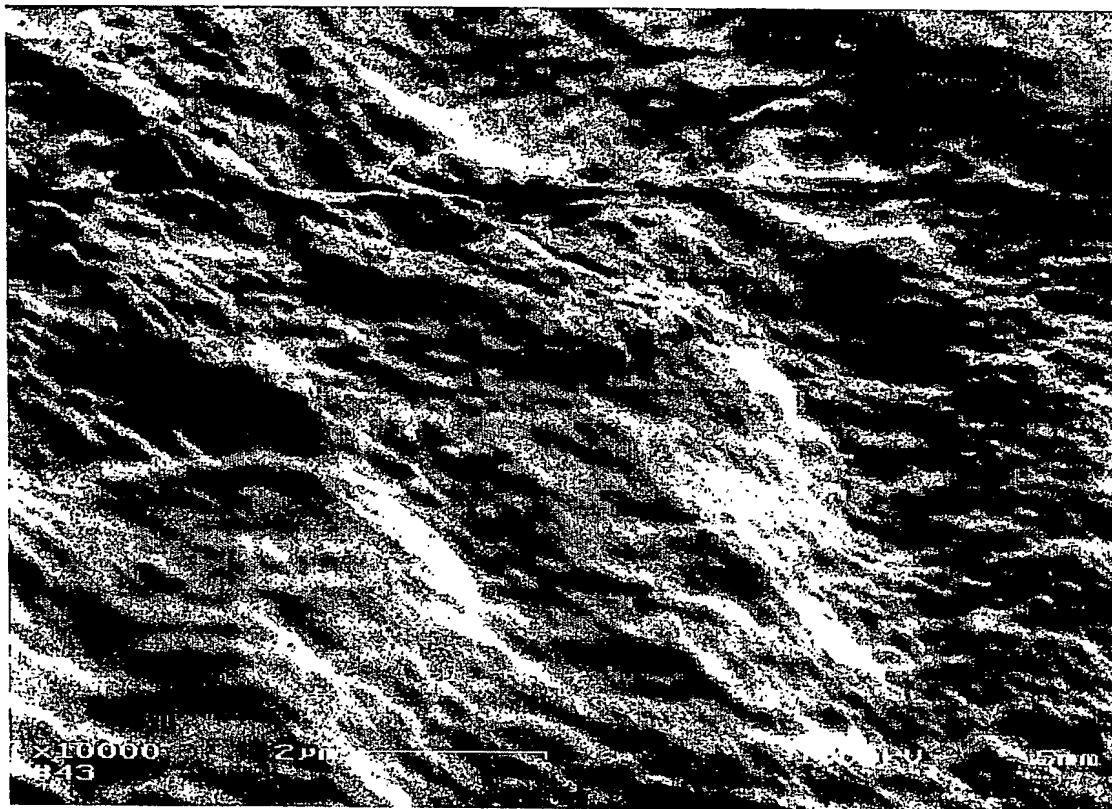


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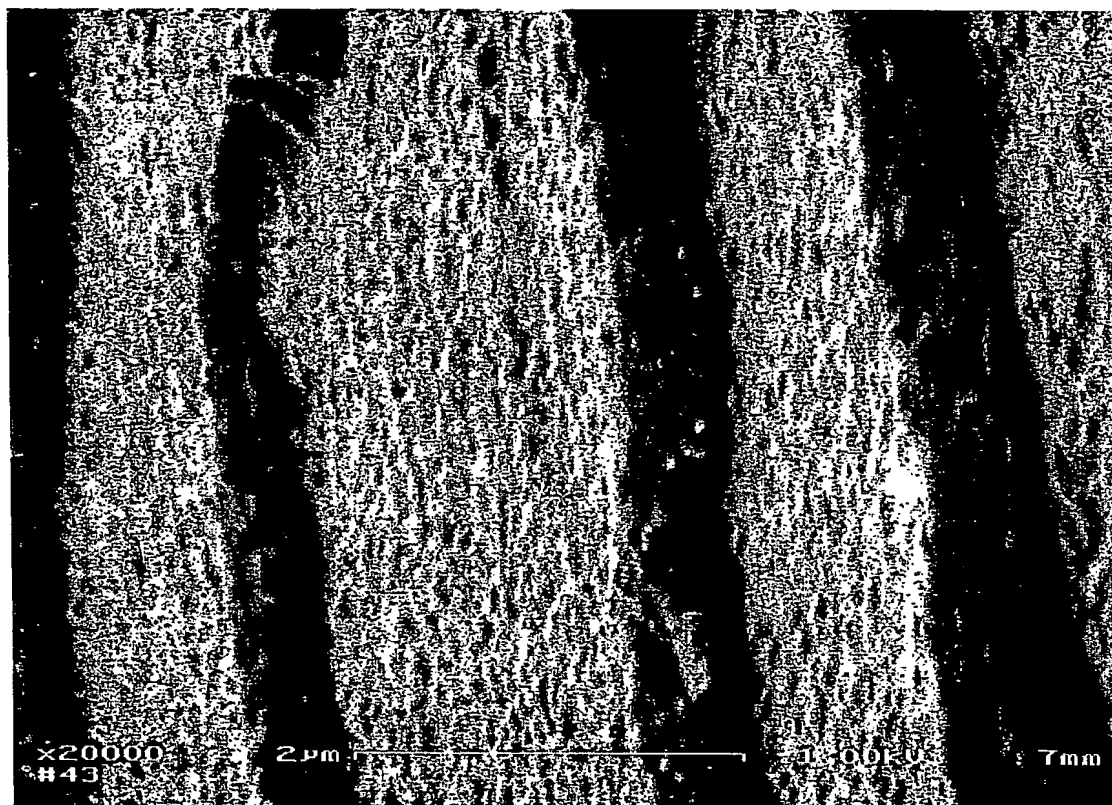


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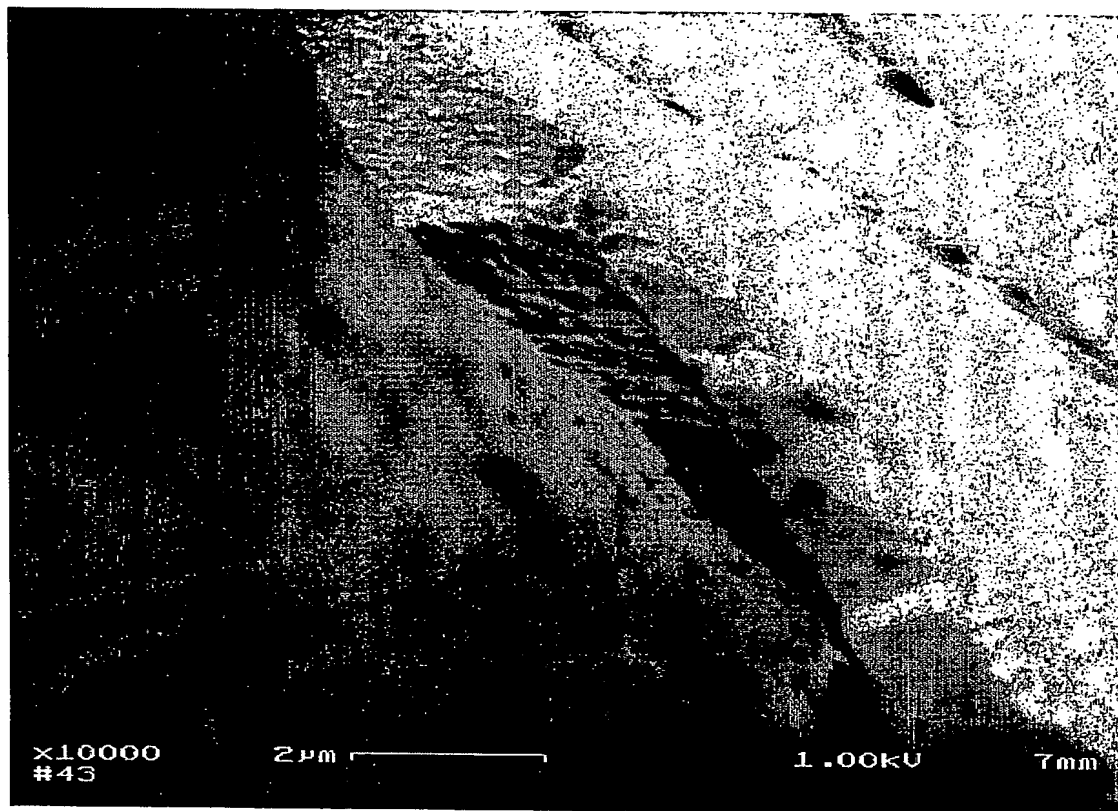


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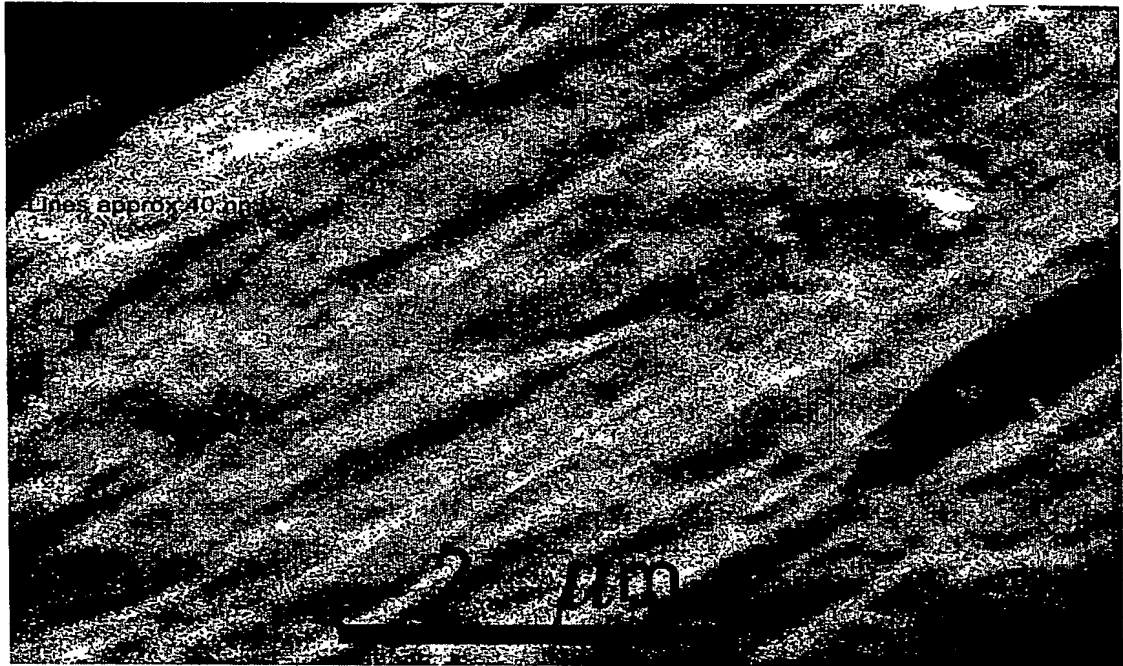


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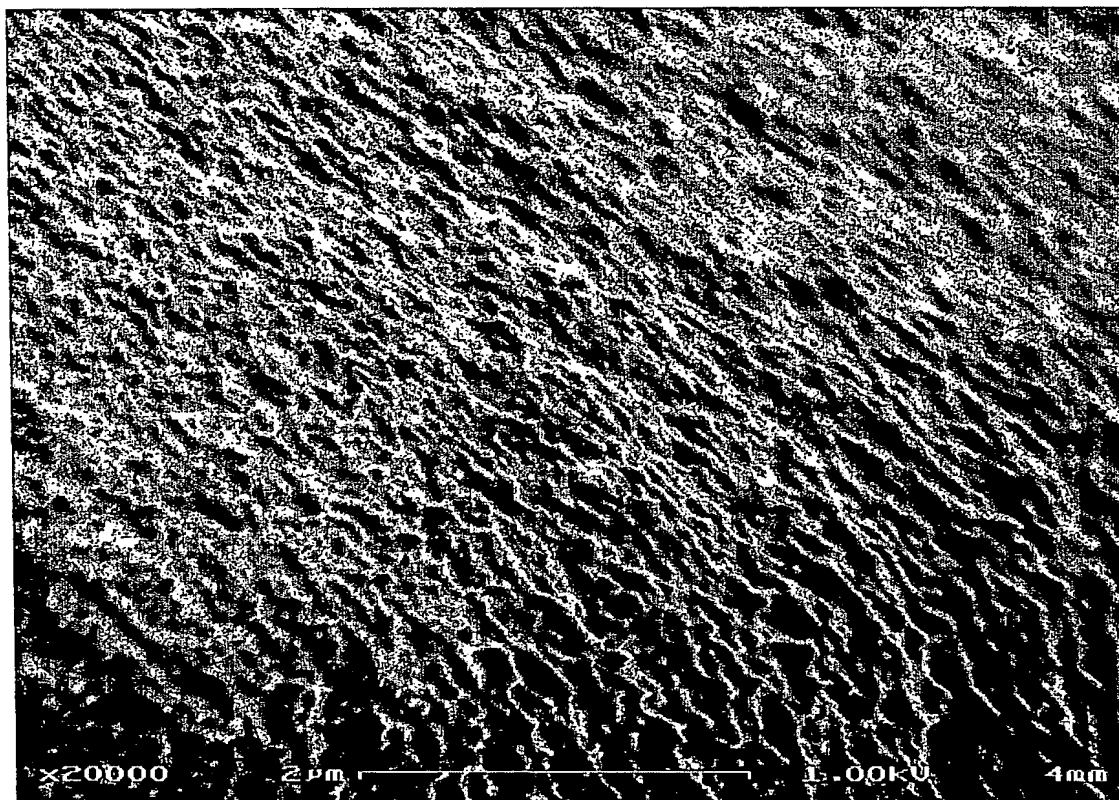


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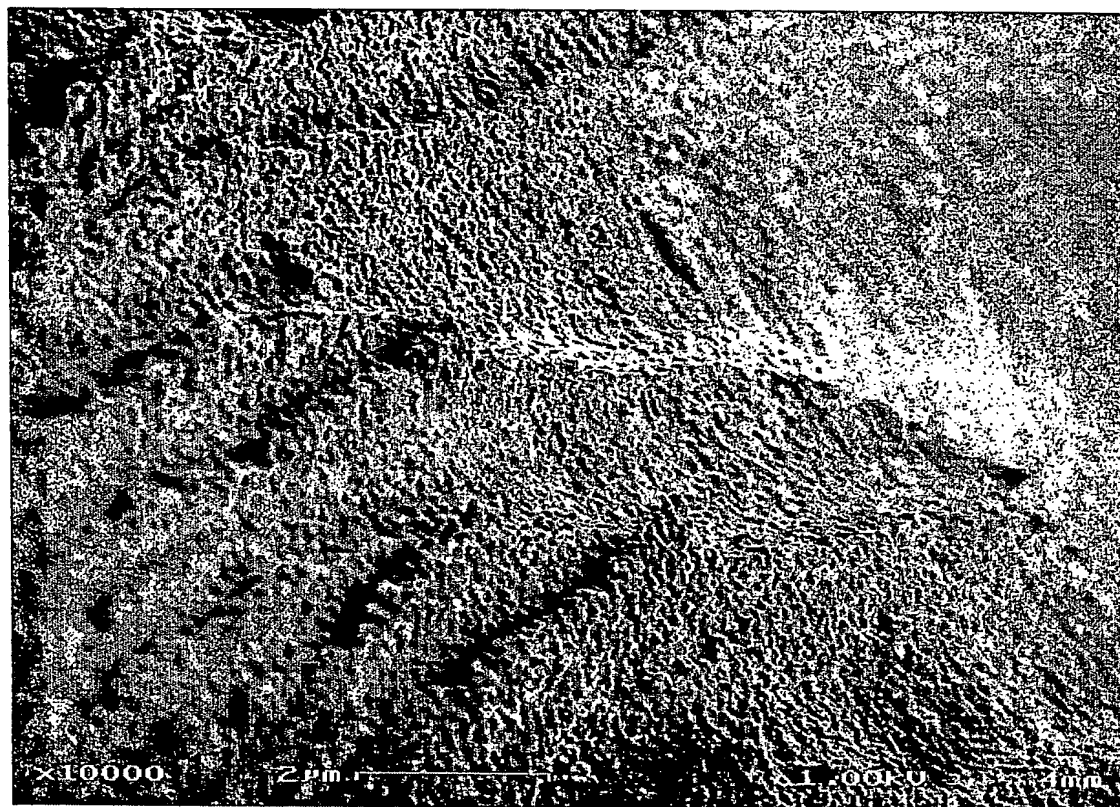


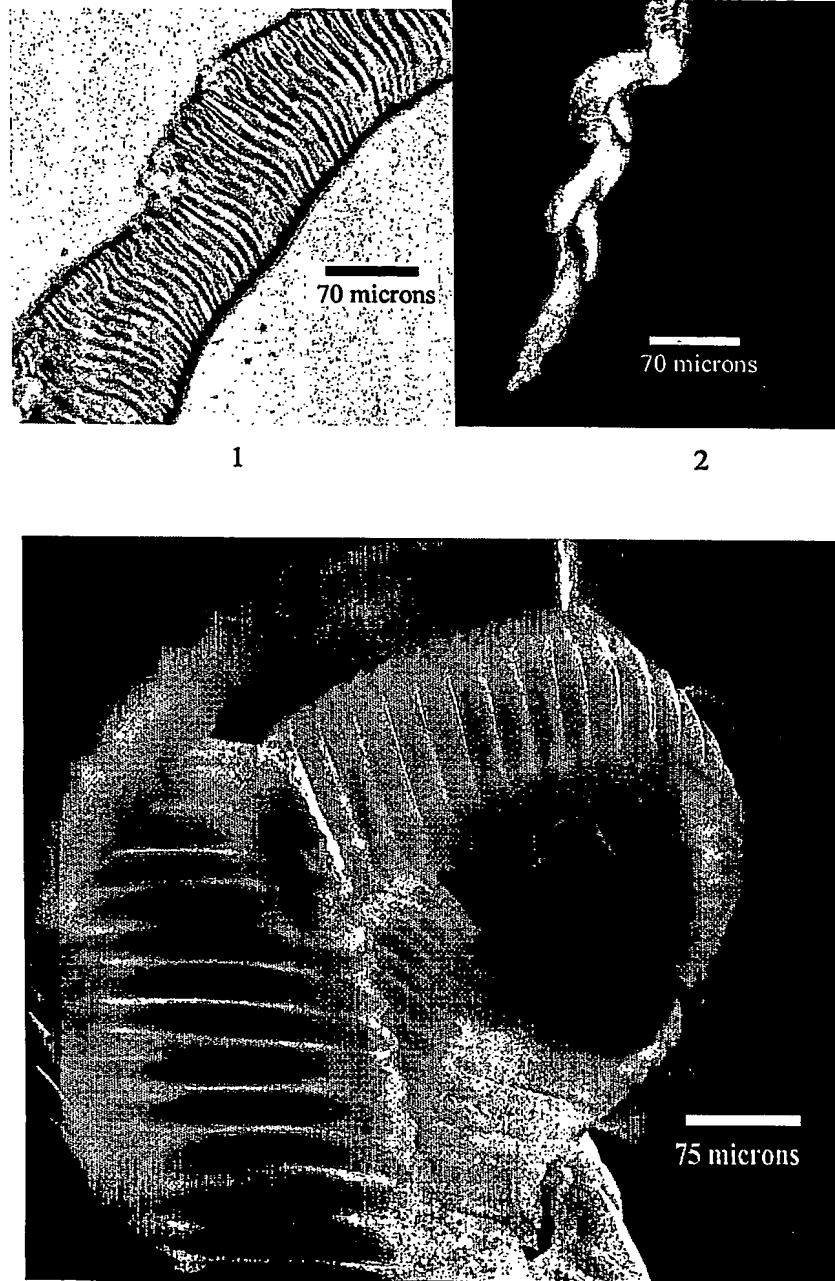
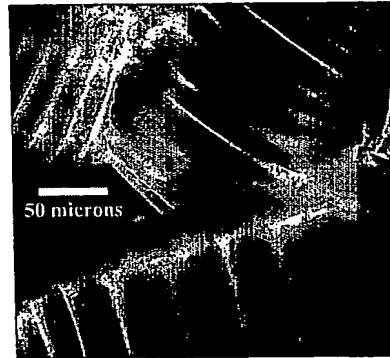
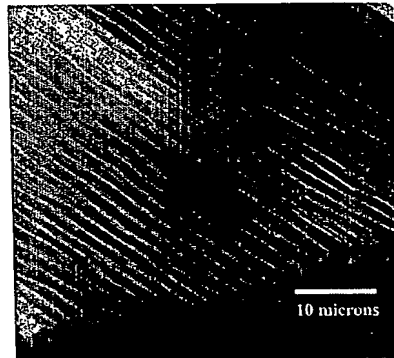
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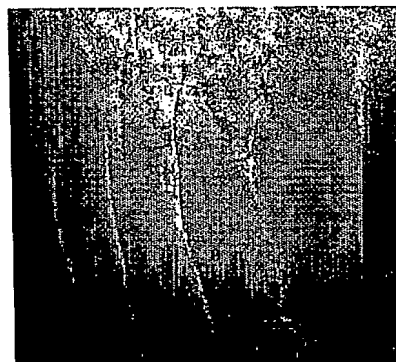
Figure 10



1



2



3

Figure 11

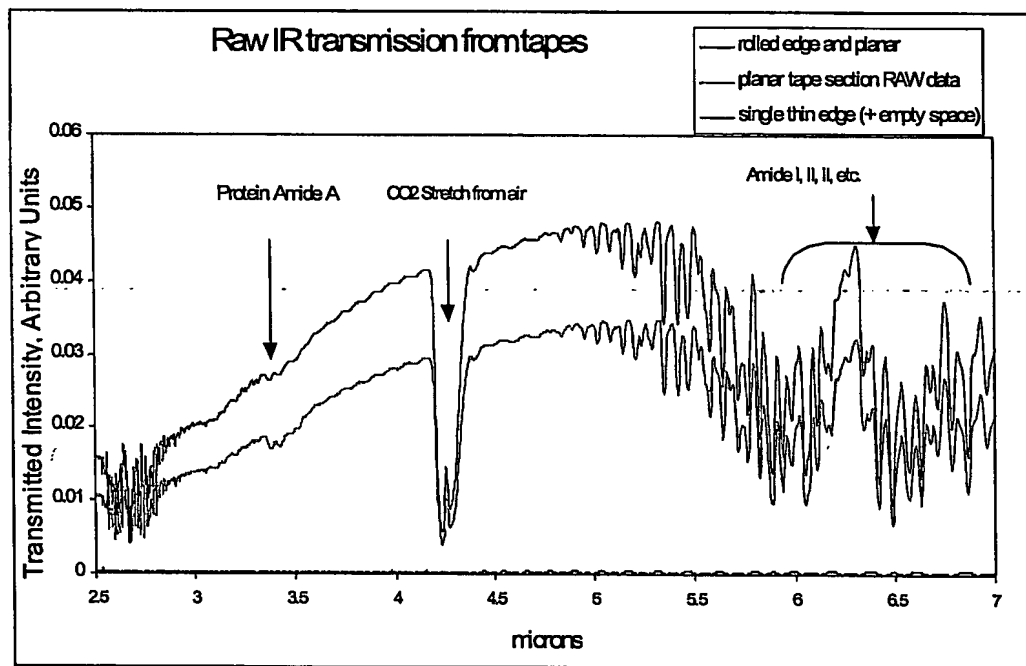


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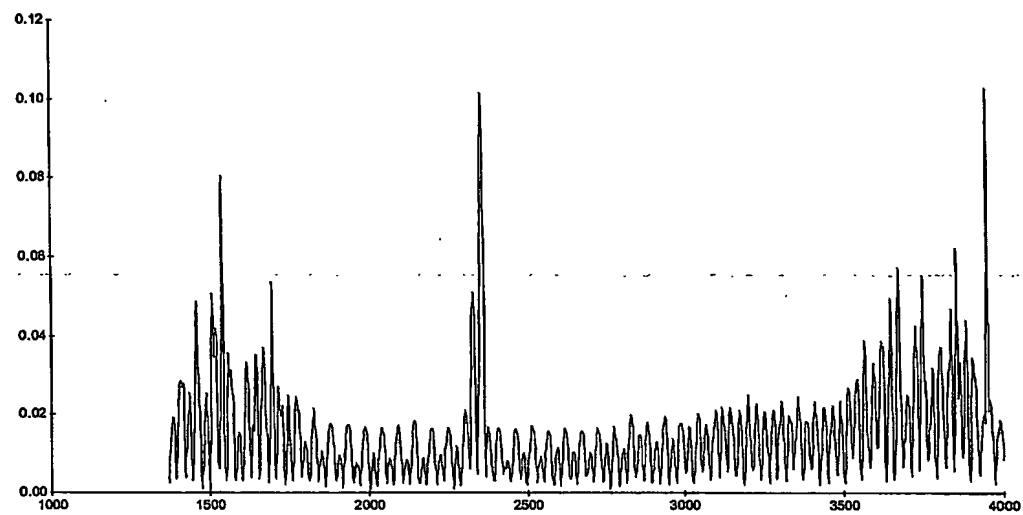


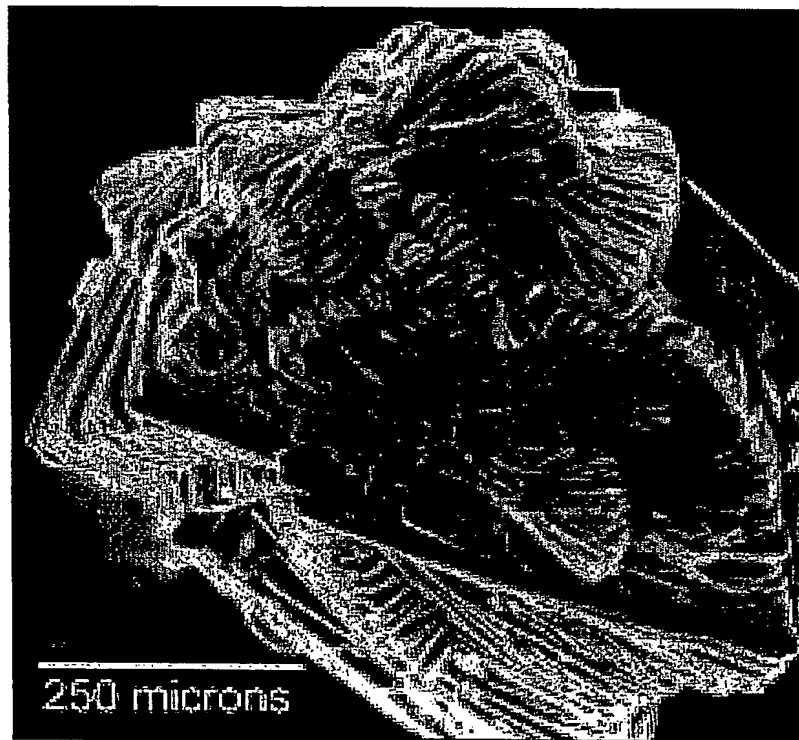
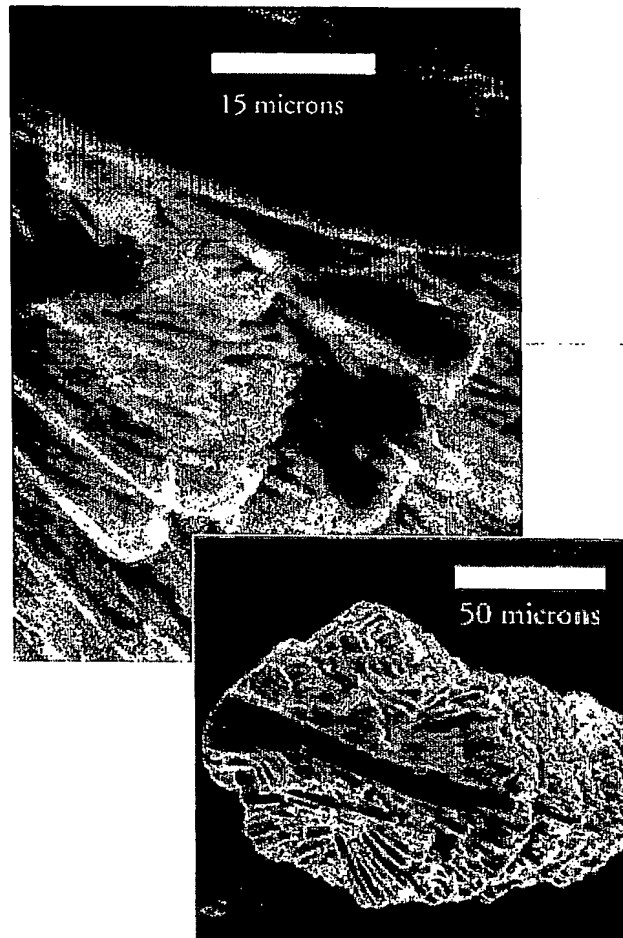
Figure 13

Figure 14



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Figure 15

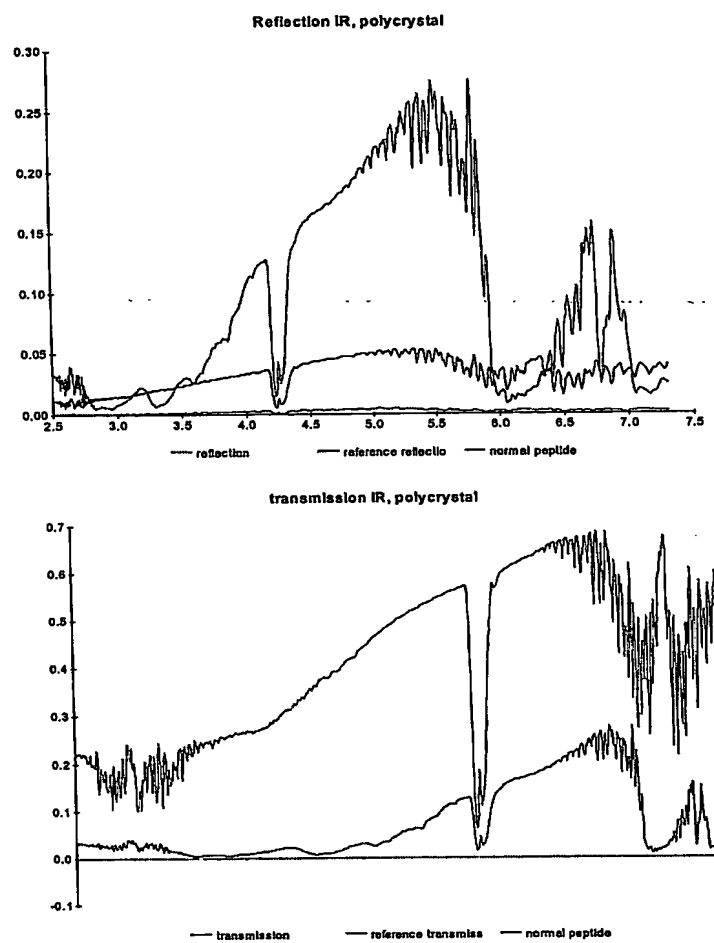


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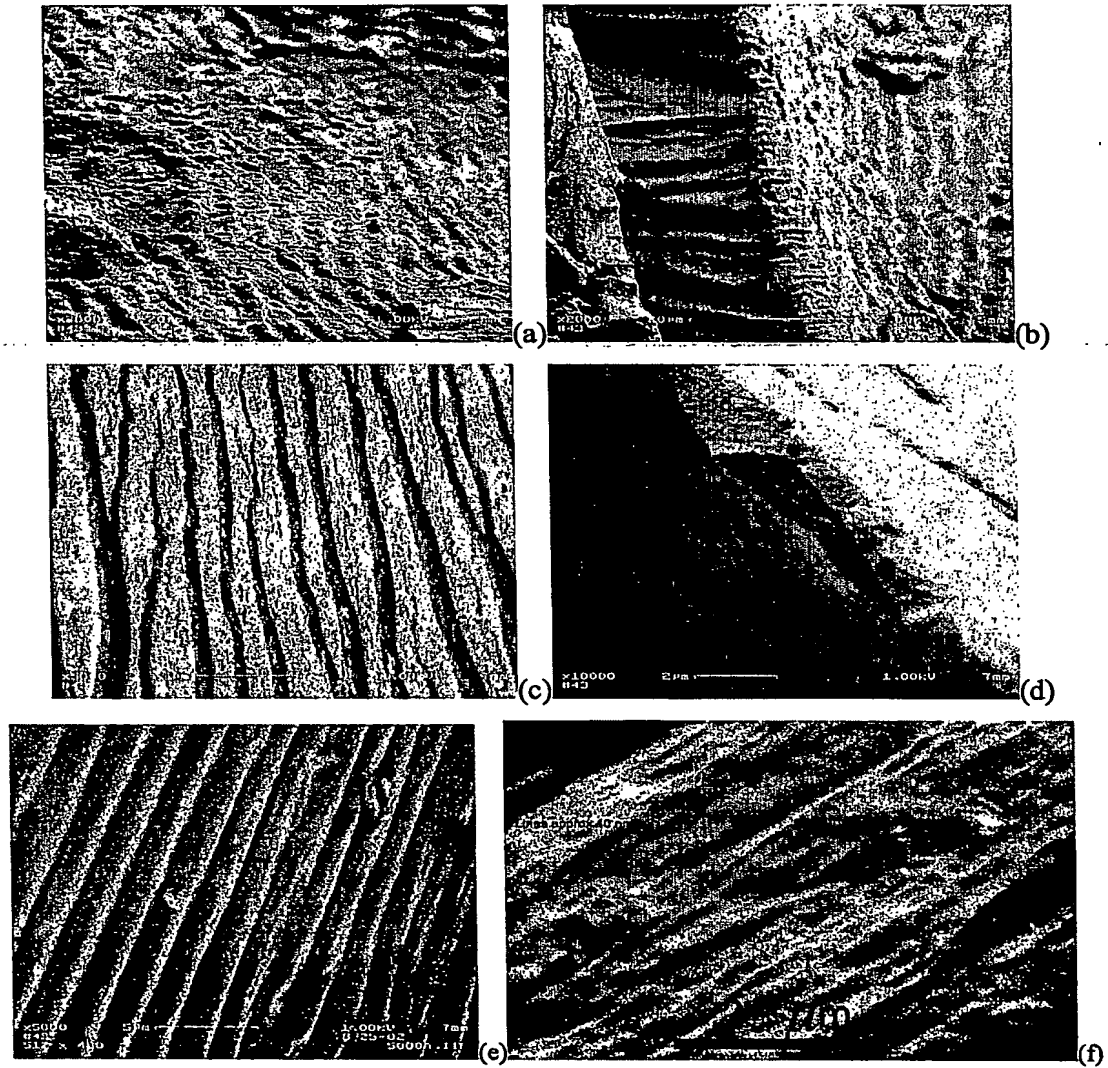


Figure 17



Figure 18



Figure 19

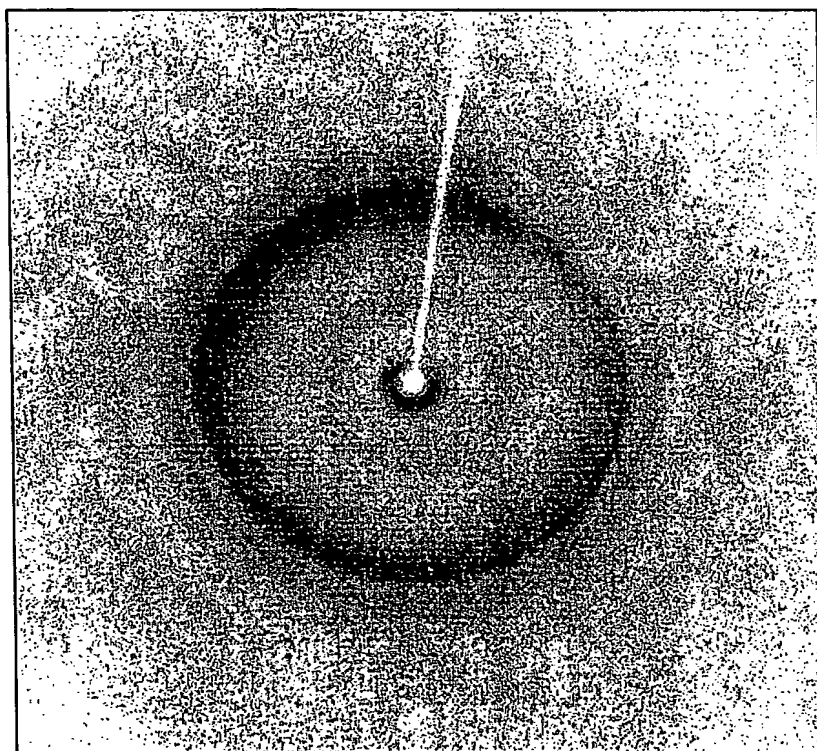
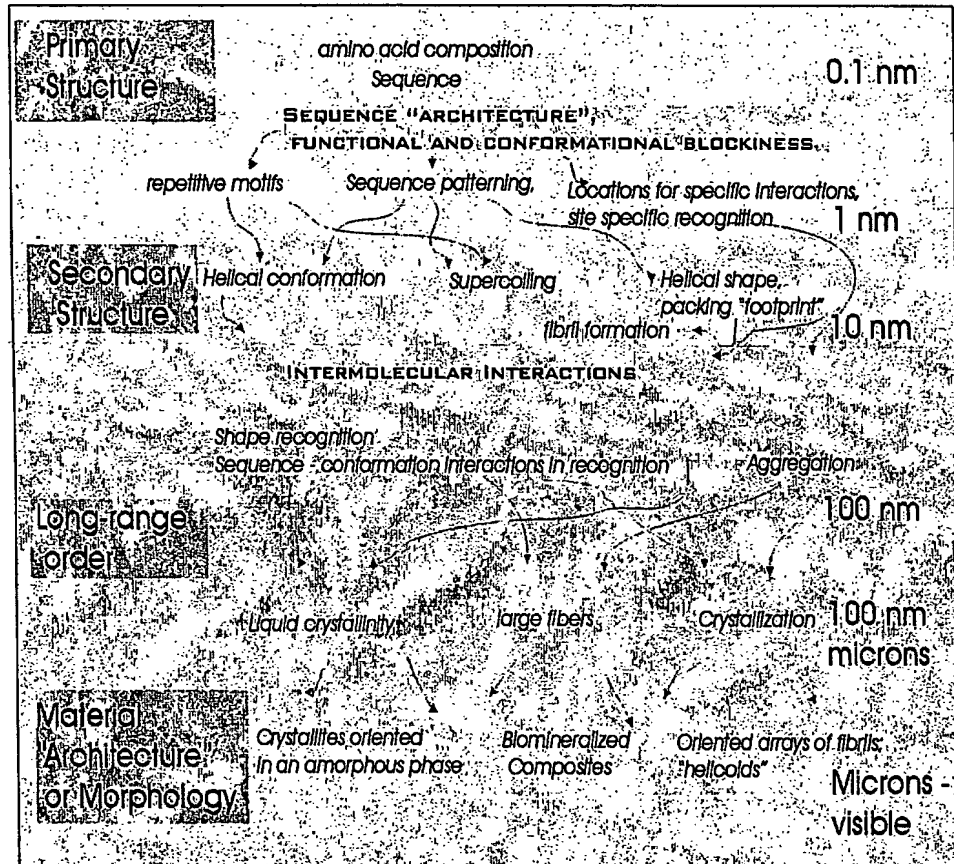


Figure 20



- Long homogeneous helical domains
- Not necessarily "folded"
- Polymorphic secondary structure
- Material formed by mesophase
- Structural role
- Extended fibers or fibrils
 - similar to synthetic polymers
 - can be polycrystalline, mineralized

Figure 21

•“Liquid Crystal”

—Molecules anisotropic

—orientation, possibly some position

Chiral one dimensional liquid crystal



Two dimensional liquid crystals

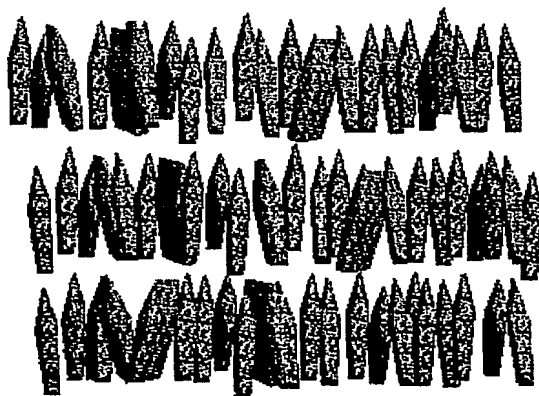


Figure 22

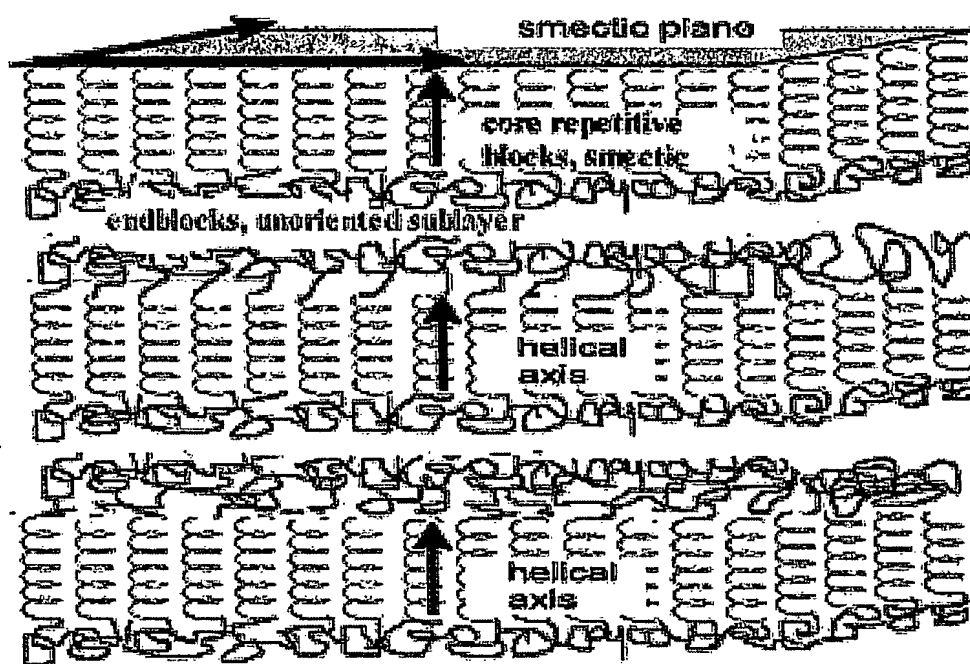
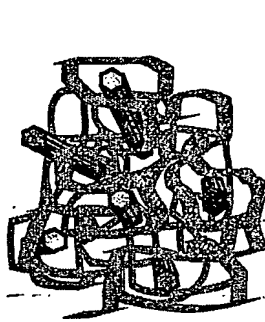
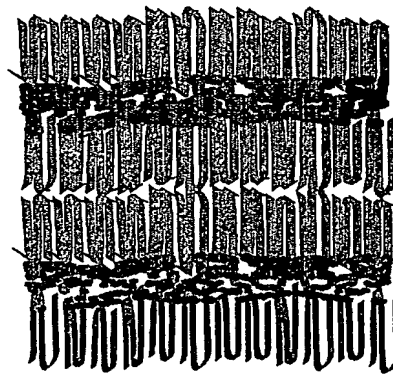
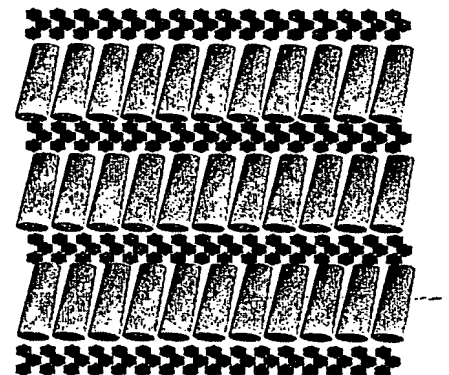


Figure 23

1. Nanocomposite -
nanodomains of
one phase
separated by
nanoscale
domains of a
second phase



2. Simple Patterned
Nanocomposite
(from smectic
layers)



3. "Cocrystal" -
peptide phase
crystallizes
and/or
inorganic phase
crystallizes
within layers

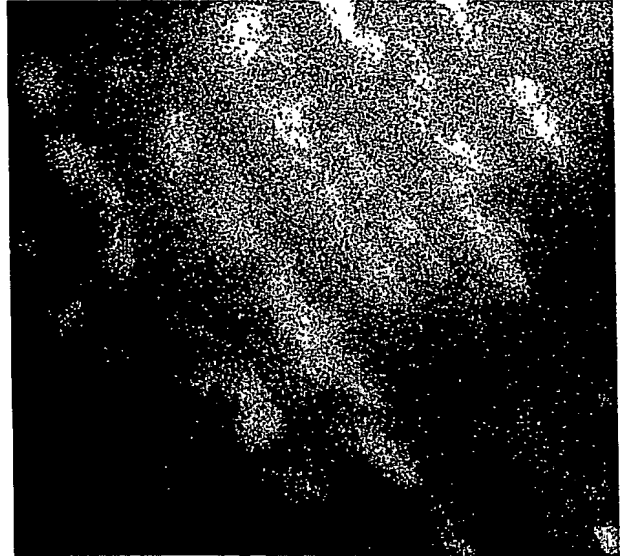
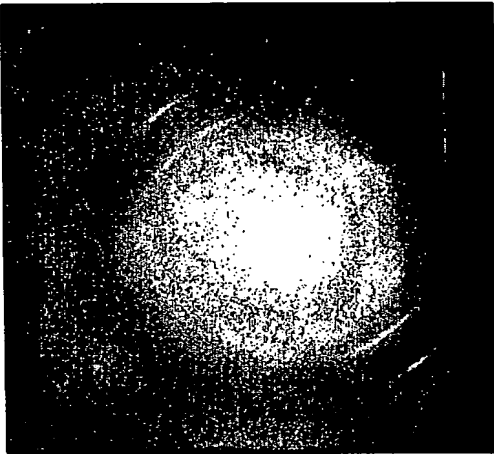
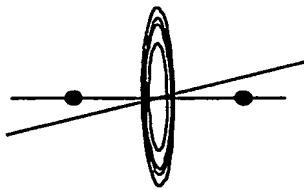
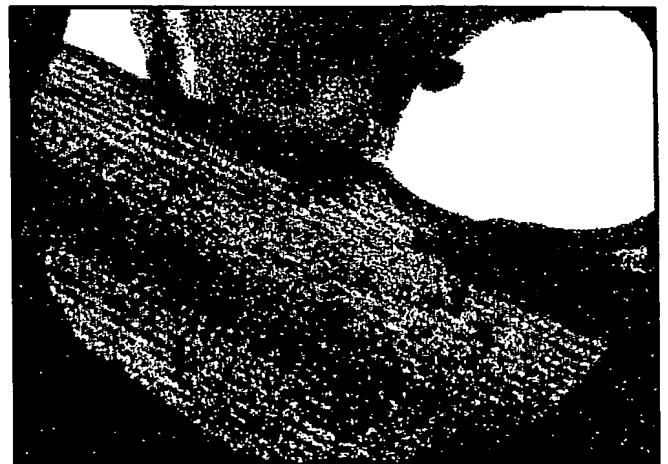
Figure 24**Silkworm****Reciprocal Lattice for
Cholesteric Film****Cholesteric
Diffraction
Pattern
Expected**

Figure 25

Peptide (GAGAGS) core

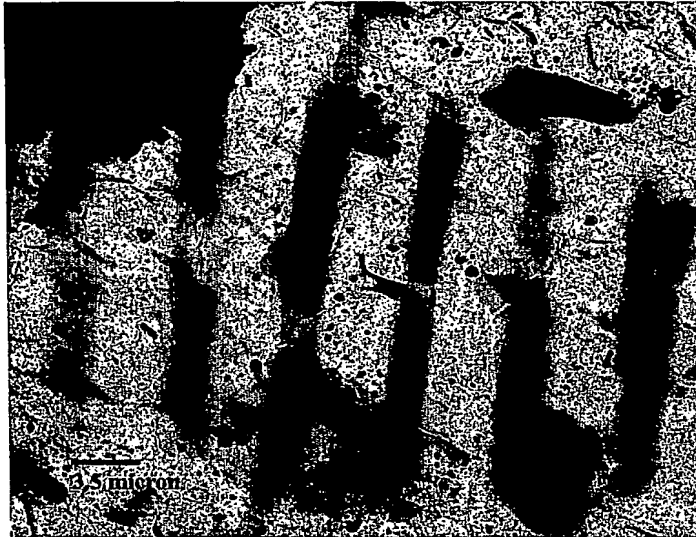


Met triggered Spider silk (biosynthetic)



Figure 26

Peptides



Native Proteins (silks)

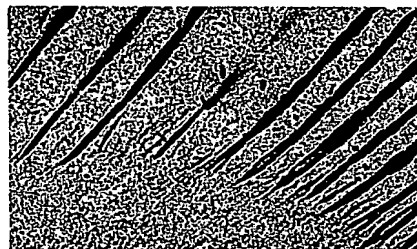
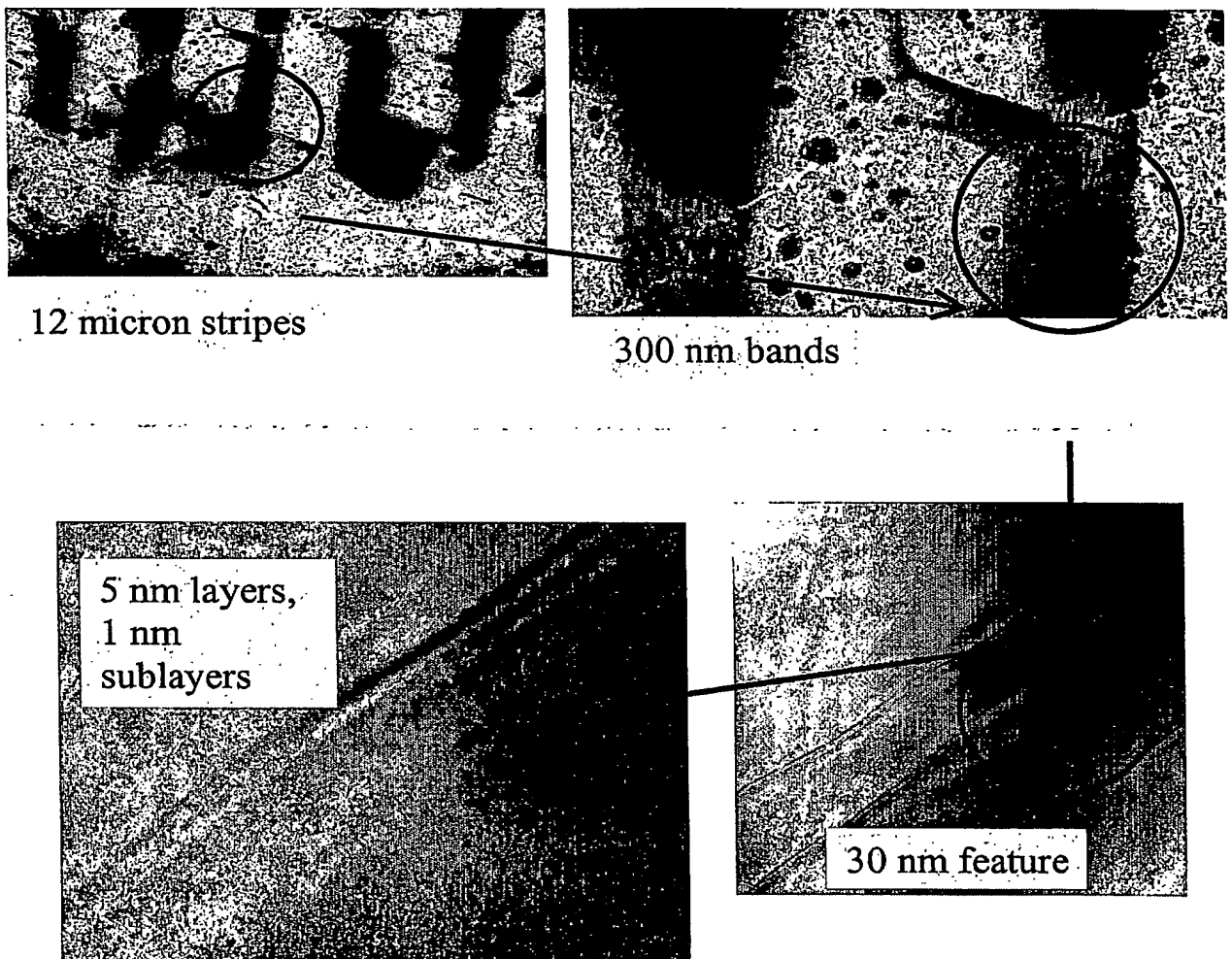


Figure 27



Air water interface from
EDTA-Na aqueous solution of
(Glu)₅(Gly-Asp-Val-Gly-Gly-
Ala-Gly-Ala-Thr-Gly-Gly-
Ser)₂(Glu)₅

Figure 28

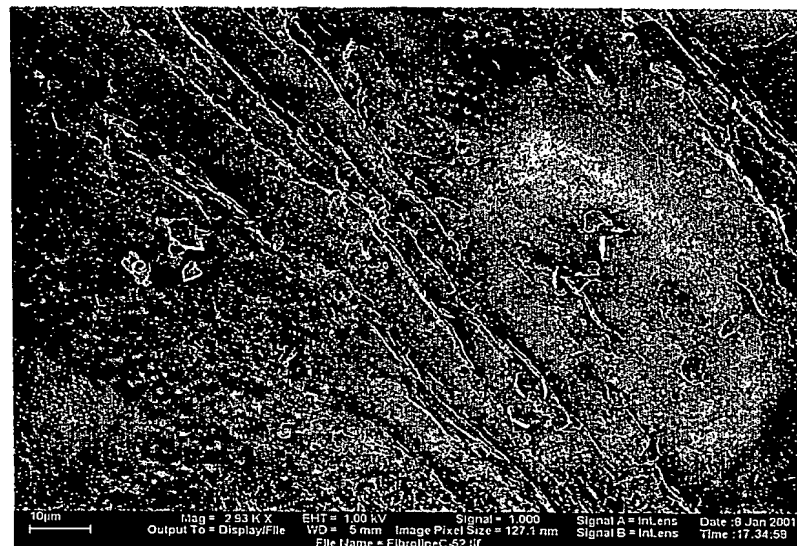
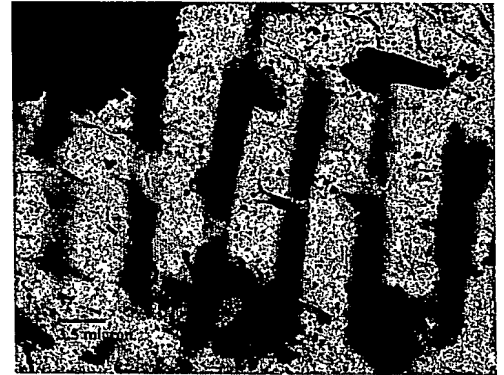
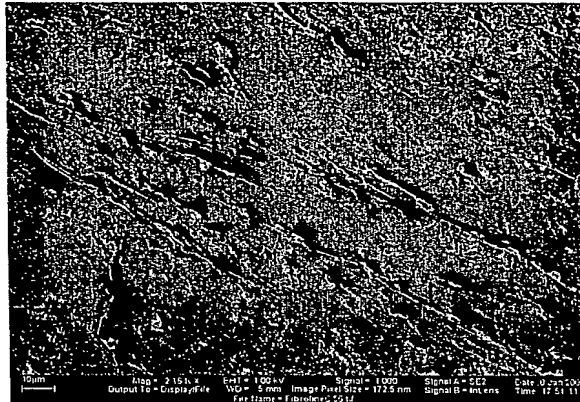
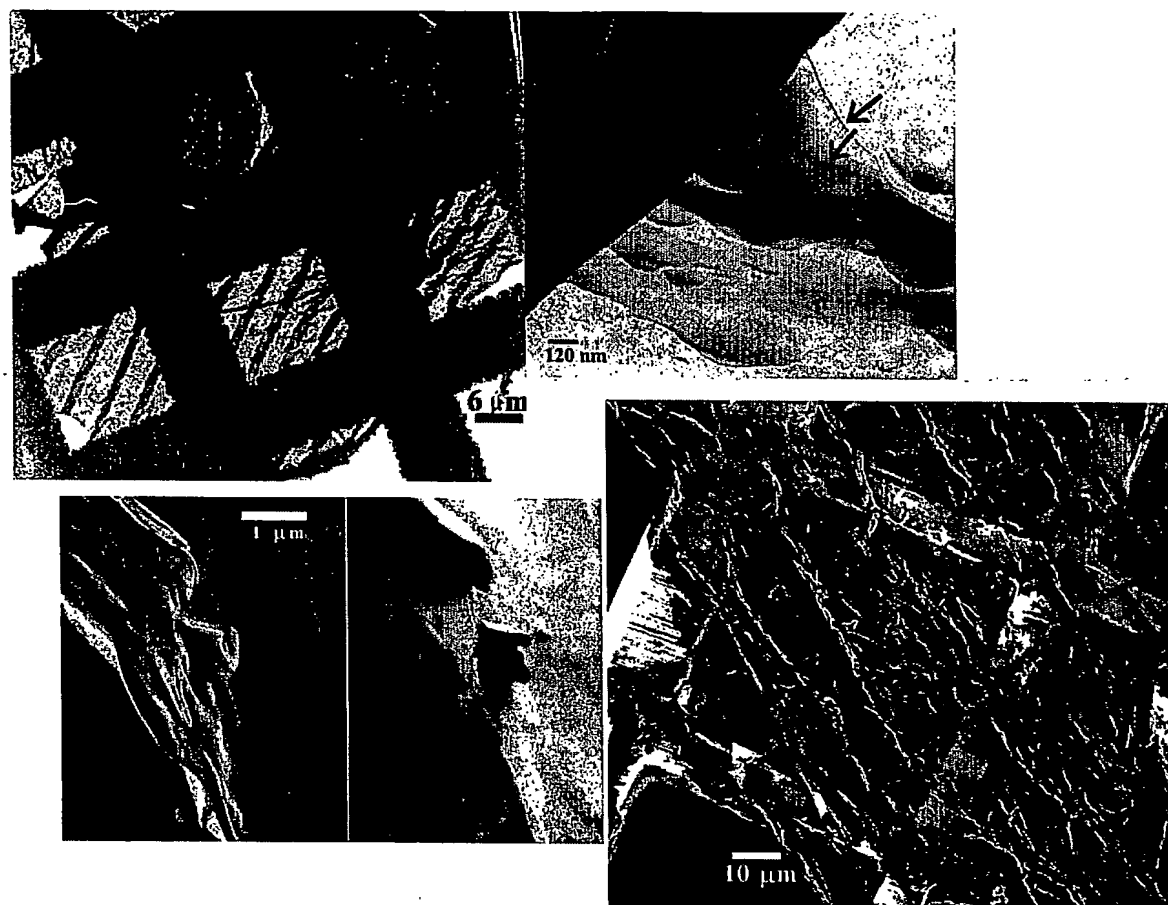
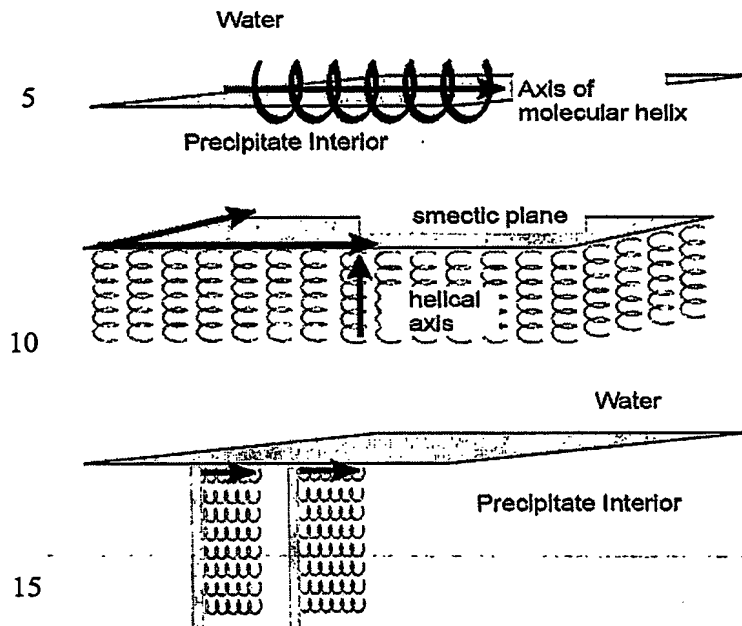


Figure 29



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Figure 30



- A designed helix with a stronger hydrophobic/hydrophilic difference will be more readily stabilized and anchored parallel to the interface
- Helical axis is perpendicular to smectic layer plane
- Helices which tend to be parallel to interface and film result in layers more often normal to film

Figure 31

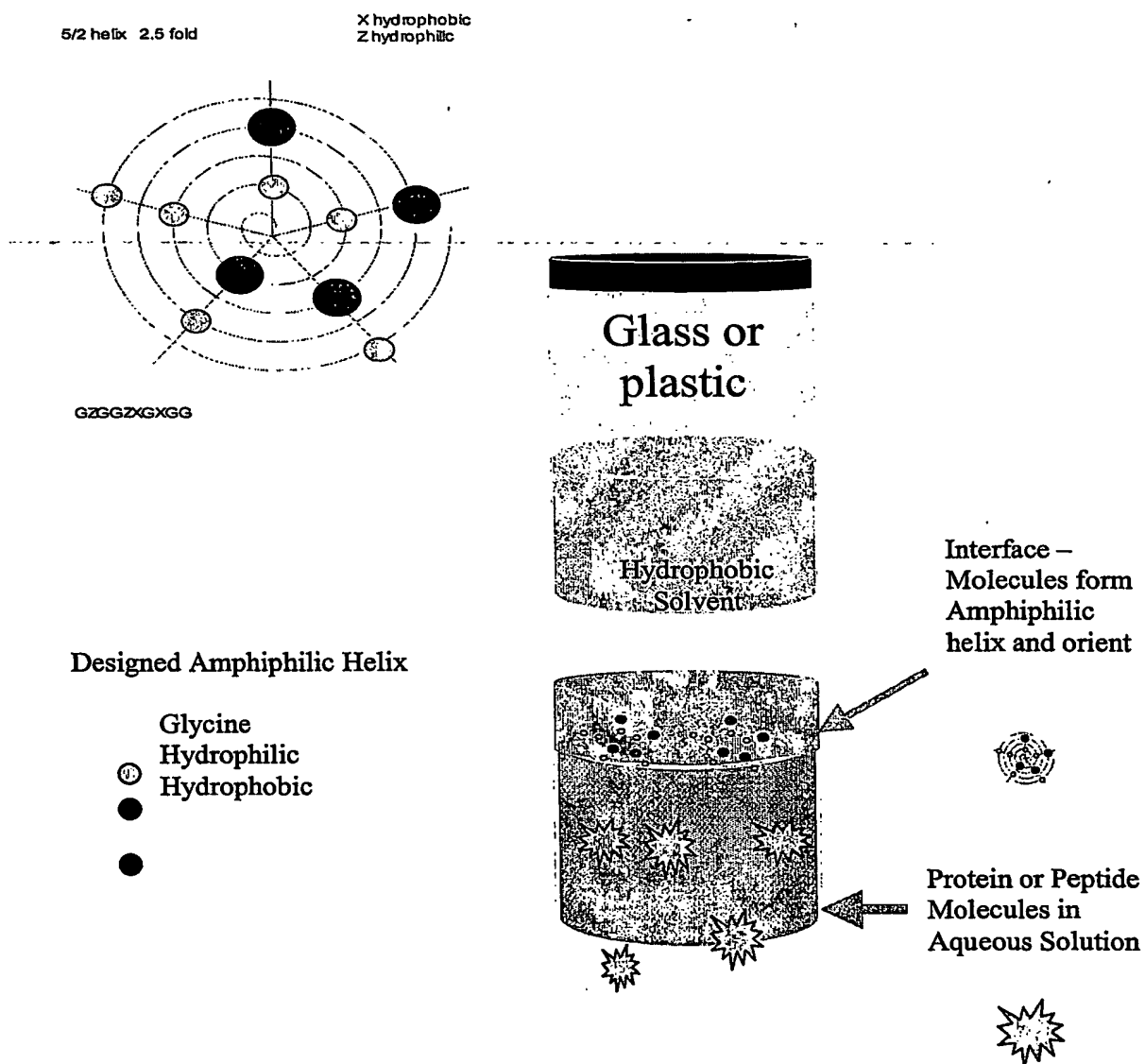


Figure 32

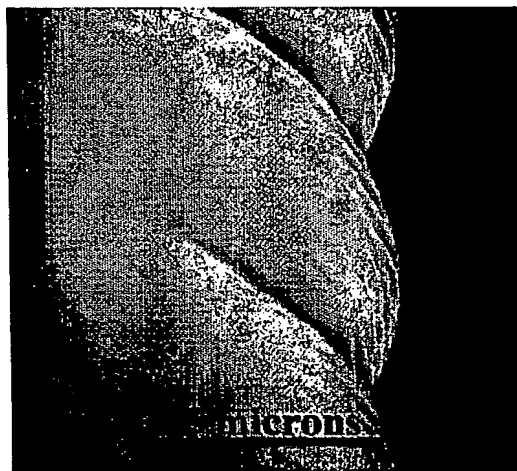
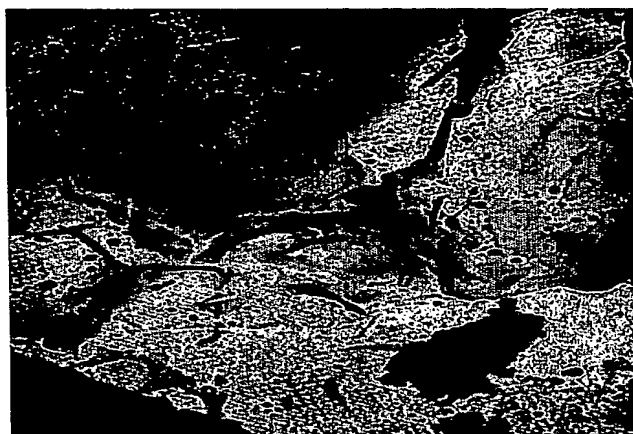
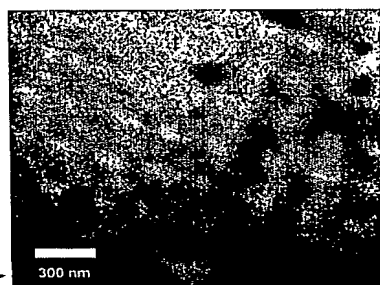
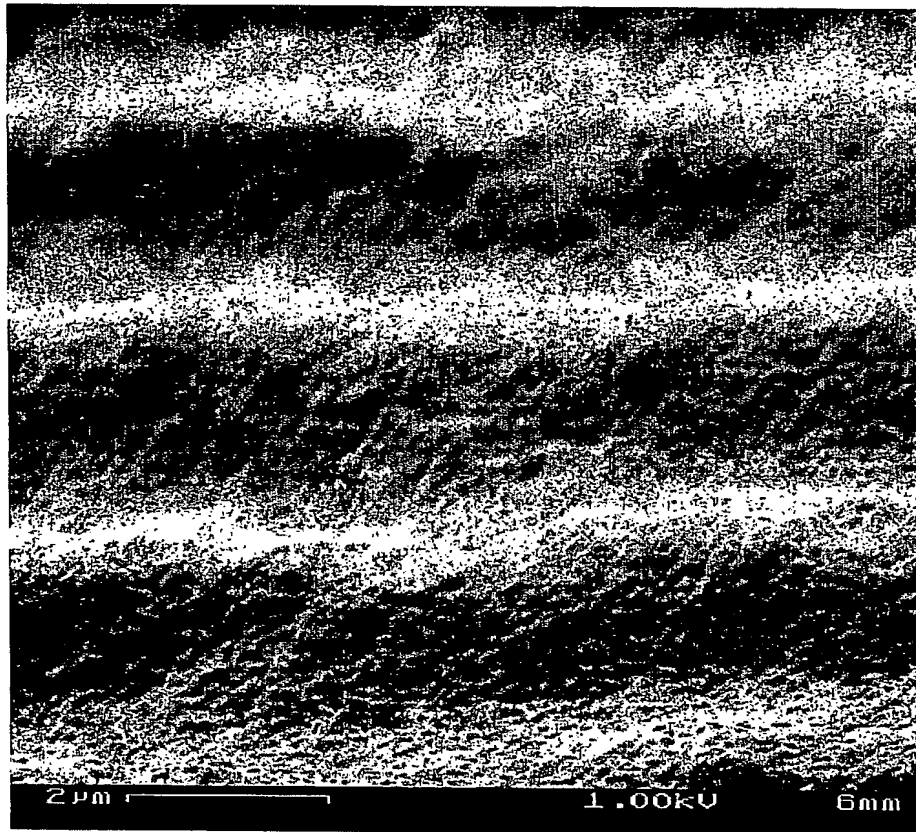


Figure 33



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